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January 30, 2015

David Denk  
Regional Permit Administrator  
NYSDEC, Region 9  
270 Michigan Avenue  
Buffalo, New York 14203

*Hyland Facilities Landfill Expansion*  
*DEC Application No.: 9-0232-00003/00002*

Dear Mr. Denk,

Thank you for re-opening the comment period on the above application.

I submit these comments on behalf of neighboring property owner Elmer J. Lange and the Community Watersheds Clean Water Coalition, (CWCWC). As shown in the map<sup>1</sup> attached as Exhibit "A," the landfill (outlined in yellow) borders a majority of Mr. Lange's northern border and all of the western border of his 179 acres (cross-hatched in red). A prominent feature of the northwestern section of his property is the Nineteen Gully stream which originates from two tributaries on the landfill, converges and enters Mr. Lange's property. The stream then exits Mr. Lange's western border and proceeds to drain into Angelica Creek, approximately one mile upstream from its confluence with the Genesee River.

CWCWC is not-for-profit corporation which includes 50 affiliated groups representing over 120,000 individuals. Over the last fifteen years, CWCWC has worked to protect and improve New York's surface and groundwater supplies through education and advocacy.<sup>2</sup>

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<sup>1</sup> Excerpt from "Hyland Facility Associates Landfill Expansion Operation and Maintenance Manual Appendix B Environmental Monitoring," McMahan & Mann Consulting Engineers, P.C. (February 2006).

<sup>2</sup> CWCWC's mission statement states: "[t]he Coalition strives to protect and improve the waters of NYC's Croton Watershed as well as all New York State watersheds. We are an alliance of individuals and groups who believe that safe, clean and affordable drinking water is a basic human right."

Hyland Facility Associates (Applicant) has applied to the New York State Department of Environmental Conservation, (DEC), for a Part 360 Solid Waste Management Facility Permit and a Part 201 Air Title V Permit to increase the current approved design capacity at its solid waste management facility located at 6653 Herdman Road, Angelica, New York, from 1,200 tons per day to 1,790 tons per day. The application indicates maximum waste receipts for any quarter will not exceed 139,500 tons and annual waste receipts will not exceed 465,000 tons.

As set forth below, pursuant to 6 NYCRR 621.8 substantive and significant issues warrant an adjudicatory hearing to determine whether the landfill's chronic "leachate breakouts" is the source of alpha and beta radiation several times higher than background levels in the Nineteen Gully stream in the northwest area of Mr. Lange's property.

### **I. Radioactivity in Shale Drilling Wastes**

A defining characteristic of gas-rich black shale such as found in the Marcellus and Utica formations is the high levels of radioactivity associated with the higher levels Total Organic Carbon (TOC). Drilling logs by gas companies and reports by USGS show that radium concentrations are up to 32 times surface concentrations in black shales.

Natural gas drilling in shales involves drilling a vertical hole down to the shale formation using a rotary drill. Sections of pipe are added as the bore descends and drilling fluid (a.k.a. "drilling mud") is circulated through the sections of pipe bringing rock cuttings to the surface. Once the vertical hole reaches the target formation, the drill bore is directed horizontally into the shale. The well bore intercepts pockets of water that have become saturated with radium-226 and other radionuclides and salts as a result of being trapped for eons in the shale. The drilling fluid mixes with rock cuttings and brine trapped within the underground pores and fractures.

The recovered solid rock cuttings from drilled wells, suspended in a mixture of drilling fluid and formation water with elevated radionuclide content, are placed on shale shakers and dewatered. The waste liquids from the drilling mud/rock cutting mixture are then re-employed to the drill bore further concentrating radium levels. Eventually the used drilling mud and rock cuttings are disposed of, typically at landfills.

DEC has sampled flowback water from vertical Marcellus shale wells and found that the liquid contained radioactive concentrations as high as 267 times the limit for discharge into the environment and thousands of times the limit for drinking water (Davies 2009). Brine from horizontal drilling, as being done

throughout Pennsylvania, will be much more radioactive, quoted by New York DEC as high as 15,000 picocuries per liter (pCi/L) (Resnikoff et al. 2010) - 3,000 times the safe drinking water limit of 5 pCi/L.

Radium-226 has a half life of 1600 years and, if deposited in a landfill (or any other general area due to incorrect wastewater treatment), will remain there and eventually leach out essentially forever ((Resnikoff et al. 2010)).

#### **A. Regulatory Framework – NORM, TENORM**

EPA's website discusses issues concerning oil and gas deposits containing naturally-occurring radionuclides, which are referred to as NORM, naturally occurring radioactive material, *i.e.* uranium (and its decay products), thorium (and decay products), radium (and decay products) and lead-210.

EPA explains that radionuclides, along with other minerals that are dissolved in the drilling produced brine, precipitate (separate and settle) out forming various wastes at the surface such as mineral scales inside pipes, sludges, contaminated equipment or components and produced waters. EPA then concludes:

Because the extraction process concentrates the naturally occurring radionuclides and exposes them to the surface environment and human contact, these wastes are classified as TENORM.  
[Technologically Enhanced Naturally Occurring Radioactive Material]

EPA is working with other organizations that are also seeking to solve the problem of TENORM such as the Conference of Radiation Control Program Directors (CRCPD).

The CRCPD<sup>3</sup> is also the organization through which state radiation protection programs coordinate their efforts.

CRCPD's Commission on NORM has developed model state regulations for TENORM, Part N of Suggested State Regulation on Control of Radiation (SSRCR) from Commission on NORM.

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<sup>3</sup> CRCPD's mission is "to promote consistency in addressing and resolving radiation protection issues, to encourage high standards of quality in radiation protection programs, and to provide leadership in radiation safety and education" and "assure that radiation exposure to individuals is kept to the lowest practical level, while not restricting its beneficial uses." See <http://www.crcpd.org/about/about.aspx>

Many states, particularly Ohio and Pennsylvania, have adopted regulations similar to Part N defining TENORM as “naturally occurring radioactive material with radionuclide concentrations that are increased by or as a result of past or present human activities.” (See Attachment “B”). Examples of potential TENORM from oil and gas drilling include tank bottoms, spent drilling muds and pipe scale. In fact, in Ohio, solid waste landfills can only accept TENORM wastes for disposal at concentrations less than 5 picocuries per gram (pCi/g) above natural background levels.

Pennsylvania has just completed a comprehensive analysis of oil and gas (O&G) TENORM.<sup>4</sup>

The study found Radium-226 within hydraulic fracturing fluid ranging from 64.0 – 21,000 pCi/L and Radium-228 levels from 4.5 – 1,640 pCi/L. The hydraulic fracturing fluid was made up of a combination of fresh water, produced water, and reuse flowback fluid. (Section 3.3.2). Radium-226 concentrations were also detected within flowback fluid samples ranging from 551 – 25,500 pCi/L. Radium-228 was also detected ranging from 248 – 1,740 pCi/L. (Section 3.3.3)

Aside from “a potential for radiological environmental impacts from spills of produced water from unconventional natural gas well sites and from spills that could occur from the transportation and delivery of this fluid” regarding landfill disposal the study found:

[T]here may be a radiological environmental impact to soil from the sediments from landfill leachate treatment facilities that treat leachate from landfills that accept O&G waste for disposal.

Id. at 9-8 to 9-9. The report studied landfills that accept O&G waste finding:

The three landfills that had filter cake sampled also discharged effluent water to the environment. At each of the three effluent outfalls, a sediment-impacted soil sample was collected. Radium was detected in all of the samples. Radium-226 results ranged from 2.82 to 4.46 pCi/g with an average of 3.57 pCi/g. Radium-228 results ranged from 0.979 to 2.53 pCi/g with an average of 1.65 pCi/g. (Section 5.2.3)

Thus, the study recommended that PA:

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<sup>4</sup> <http://www.portal.state.pa.us/portal/server.pt>.

- Evaluate and, if necessary, modify the landfill disposal protocol for sludges/filter cakes and other solid waste-containing TENORM.
- Conduct additional radiological sampling and analyses and radiological surveys at all facilities that treat leachate from landfills that accept waste from O&G operations to determine if there are areas of contamination that require remediation; if it is necessary to establish radiological effluent discharge limitations; and if the development and implementation of a spill policy is necessary.
- Add total Ra (Ra-226 and Ra-228) to the annual suite of contaminants of concern in leachate sample analyses.

By contrast, New York’s regulations (6 NYCRR Part 380), contain no definition of TENORM. In fact, the regulations state “[t]his Part does not apply to NORM or materials containing NORM unless processed and concentrated.” Id. at §380.1.2(e). DEC has made no findings that oil and gas wastes defined as TENORM by the EPA, Ohio and Pennsylvania are “processed and concentrated” NORM thereby deserving higher levels of scrutiny than generic non-radioactive solid waste.

However, DEC does state on its website that elevated concentrations of NORM rise to the level of “significant contamination” where they reach “more than twice background levels.”<sup>5</sup>

Similarly, the attached Cophysics reports notes that EPA’s cleanup guideline for radium is < 5 pCi/g above background levels in sediment. “The EPA uses this guideline for cleanups of sites contaminated with radium or thorium so that they may be used by the general public for homes, schools, businesses, etc.”

## **B. The Landfill’s acceptance of TENORM**

In 1995, DEC issued the Applicant a solid waste facility permit under 6 NYCRR Part 360 authorizing construction of a landfill for the disposal of Municipal Solid Waste incinerator ash only.

Over the ensuing years the Applicant sought and received DEC approval to substantially expand the landfill’s acreage and types of accepted waste.

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<sup>5</sup> <http://www.dec.ny.gov/chemical/23473.html>.

Most significantly, in 2011, the landfill began accepting shale gas drilling wastes from Pennsylvania. The 2011 total received amounted to 90,315 tons. (Hyland Facilities 2012 Annual Report).

In 2012, the Applicant landfilled another 12,039 tons of shale gas drilling wastes including tons of “brine impact soil” and “soil w/drill mud.” It continued to accept shale drilling wastes containing radioactivity during 2013. Though defined by Pennsylvania as TENORM, DEC did nothing to consider the thousands of imported tons of TENORM any differently than NORM.

The landfill has a monitor employed by DEC. The monitor issues monthly reports concerning the landfill’s operations. These monthly reports for the period from 2013 to the present show a startling number of “leachate breakouts” comprised of uncontained leachate draining into the Nineteen Gully stream on the south side of the landfill. From May through July, each report identified that “[l]eachate seeps remain an ongoing concern.” A typical monthly comment was that “[t]he south slope had several breakouts throughout the month.” August 2013 was particularly troublesome, as the monitor reported “numerous breakouts”:

**Cell 4A:** Breakouts were occurring in the corner of Cell 4A and Cell 3B, this area should remain a focus. The south slope of 4A had numerous breakouts throughout the month with one reaching the storm water ditch. The west side of 4A access road had a breakout that reached the storm water ditch. Both storm water ditches were cleaned and the breakouts were repaired.

The monitor noted for October 2013, that, again:

The south slope of 4A had numerous breakouts throughout the month. These breakouts have been repaired but seem to keep coming back. The west slope of 4A had a breakout near the roadway.

Through November 2013, the monitor continued to report that “[l]eachate seeps remain an ongoing concern” with ongoing “breakouts” on the south slope. December 2013 was no different. “Leachate seeps remain an ongoing concern” and “[t]he west slope of 4A had a breakout near the roadway during the 12/5 visit,” and “[b]reakouts were found on the south slope of 4A throughout the month.” In every ensuing month to October 2014, the monitor reported chronic leachate breakouts especially in the headwater drainage area for Nineteen Gully stream. December 2014, saw a return of leachate breakouts “noted during the 12/22 visit. Two on the east slope of Cells 1 and 2 and one on the south slope of Cell 4A.”

### **C. Radiological testing**

In 2010, sediment from the Hyland landfill site was tested for background levels of radiation. The report by Cophysics, determined background levels to be 0.8 pCi/g for radium-226 with an error margin of 0.1. (See Cophysics report at Table 1 and Appendix A included herewith as Exhibit “C”).

Prompted by concerns that the commencement of accepting shale gas wastes in 2011 may be leaching radioactivity into the sediment and water of Nineteen Gully, Mr. Lange authorized the systematic testing of sediment and water from the Nineteen Gully stream on his property by pCi/Labs, Inc.,<sup>6</sup> in Orangeburg, New York.

On April 6, 2014 water samples taken from Mr. Lange’s property in the Nineteen Gully stream<sup>7</sup> showed gross alpha (GA) levels of 0.0 pCi/L and gross beta (GB) levels of 0.39 pCi/L. Further downstream from Mr. Lange’s property, (approximately one mile),<sup>8</sup> a sample taken on June 1, 2014 tested GA slightly higher at 0.86 pCi/L and gross beta results were 2.5 pCi/L.

On January 16, 2015, 14 sediment samples and three additional water samples were collected by Atlantic Testing from Mr. Lange’s property where the stream enters his property from the landfill.

These results for the three water samples show GA levels of 2.08, 3.74 and 2.95 pCi/L and GB levels of 4.63, 6.65 and 6.09 pCi/L. (See Attached Exhibit “D”).

At this writing the sediment results are not available but will be by next Tuesday, February 3<sup>rd</sup>, and will be forwarded for the record.

In sum, the water sampling results demonstrate a pattern of episodically elevated radioactivity occurring in the Nineteen Gully stream.

### **D. Application to (again) Expand Amount of Landfill waste**

The Hyland landfill has accepted thousands of tons of drilling wastes from shale gas wells in Pennsylvania.

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<sup>6</sup> pCi Labs, Inc., is a NELAC accredited laboratory specializing in the analysis of radioactive contaminants identified by the U.S. EPA Safe Drinking Water Act (U.S. EPA SDWA). Their ELAP certified laboratory also measures radioactive contaminants in non-potable water as well as other matrices.

<sup>7</sup> Lat. 42.27868333, Long. -78.01308333 shown as Testing Point “A” on Exhibit “A”.

<sup>8</sup> Lat. 42.27051667, Long. -78.0326 shown as Testing Point “B” on Exhibit “A”.

Based upon the test results of elevated GA and GB and the reports of chronic leachate breakout at the south end of the landfill, the evidence suggests that where a rain or snow melt event coincides with a leak, two pathways of contamination open up: 1) Leaked radionuclides dissolve in rain water and snow melt, which then runs off the landfill surface into down gradient areas; and 2) Leaked radionuclides bind to soil particles on the landfill surface, and the contaminated particles are transported, i.e., flushed, down the landfill surface into down gradient areas and Mr. Lange's property.

This is entirely consistent with the PA's TENORM study of landfill leachate and runoff from PA landfills which accept O&G waste.

It should be noted that the Applicant's Part 360 Permit contains the following condition (No. 81):

Surface Water. If potential contamination of surface water is suspected during facility operation due to leachate breakouts, severe erosion of intermediate/final cover, leaking of leachate from vehicles, presence of waste exterior to the landfill cells, or other physical evidence of waste release, the surface water shall be contained and shall be sampled for the Routine Parameters listed in 6 NYCRR Part 360-2.11(d)(6). Prior arrangements with a laboratory(ies), etc. shall be made to assure the availability of test results within 7 days. If the results exceed surface water quality standards of 6 NYCRR Part 703, the surface water shall be considered "contaminated" and handled in accordance with the Contingency Plan (see Solid Waste Management Permit Condition 7 of this permit). These measures are in addition to surface water monitoring requirements of the Environmental Monitoring Plan (see Solid Waste Management Permit Condition 7 of this permit). If testing shows an exceedance of groundwater effluent standards of 6 NYCRR Part 703.6 in the surface waters capable of entering the Cuba Formation (i.e waters from the perimeter drainage ditch over or directly upstream of the underlying Cuba Formation), then contingency water quality monitoring pursuant to 6 NYCRR Part 360-2.11(c)(5)(iii) shall be initiated in the Cuba Formation."

As a result of the evidence of radionuclides that are many times higher than background levels in the Nineteen Gully stream findings, Mr. Lange requests that any action on the Applicant's permit modification be suspended pending further analysis of the southern section of the landfill in the area of the headwaters of the



Nineteen Gully stream. Permit condition 81 should be modified requiring the Applicant to conduct radiological sampling of the headwaters of the Nineteen Gully stream and take all measures necessary to prevent further release of contaminants onto Mr. Lange's property.

In sum, pursuant to 6 NYCRR 621.8 substantive and significant issues warrant an adjudicatory hearing to determine whether the Hyland landfill is the source of alpha and beta radiation many times higher than background levels in the Nineteen Gully stream in the northwest area of Mr. Lange's property.

Mr. Lange and CWCWC request that the official comment period for this application be extended in order that test results of sediments may be officially entered into the record of this proceeding. We also request that DEC immediately implement corrective action requiring the Applicant to control the chronic leachate breakout and protect the Nineteen Gully stream and Mr. Lange's property from radiological contamination.

Respectfully submitted,



James Bacon